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EFFECT OF SUPPLEMENTING CURRY, MINT AND PAWPAW LEAVES ON GROWTH PERFORMANCE AND CARCASS YIELD OF SPENT LAYERS

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ABSTARCT

The aim of this study was to assess growth performance and carcass yield of spent layer chickens fed diets supplemented with curry, mint and pawpaw leaves and their combinations. A total of 210 spent layers were randomly assigned to seven broiler finisher diets (BFD) containing 0% supplement, pawpaw leaf powder (PLP), 2% curry leaf powder (CLP), 2% mint leaf powder (MLP), 1 and 2% CLP+ 1% PLP, 1% MLP+ 1% PLP and 1% CLP+1% MLP levels of supplements in a Completely Randomized Design (CRD). The experiment lasted for 21 days including initial seven days adaptation period. Proximate analysis, growth performance and carcass yield were evaluated. The data generated were subjected to analysis of variance (ANOVA). Results revealed that combination of MLP and PLP at 1:1 ratio enhanced average daily feed intake while 2% supplement of CLP decreased average daily gain. Results also indicated that 2% PLP supplement increased carcass and primal cuts yield. Supplementation of 2% PLP in the diet of spent layers significantly improves growth performance and carcass yield.

Keywords: Curry; Mint; Pawpaw; Carcass measurements and Spent layer

INTRODUCTION

Poultry production is a cheap source of animal protein, and has taken a great change in the last three decades; from a near backyard practice to a venture of industrial proportions. Consumption of poultry meat is increasing worldwide, due to high demand, as a result of increase in population (Sanda, 2015). The importance of plant products in meat production can never be overemphasized due to its enormous contribution to meat industry. The utilization of cheap and readily available plant-based feed supplements, especially those that are not readily utilized by man, has received particular attention as one of the viable alternatives to the use of synthetic products (Nwakpu *et al*., 2000; Odunsi, 2003; Ekenyem, 2006). Attention is increasingly focused on the utilization of plant-based supplements because of the negative health consequences of using their hazardous synthetic counterparts in the production of meat. The World Agro-forestry centre (WAC, 2006) reported that leaf meal processed from fodder shrubs is helping small scale poultry farmers in Tanzania to boost their income. It does not only serve as protein source, but also provide some necessary vitamins, minerals and bioactive substances (Opara, 1996).

Several researchers have used different plants leaves to improve performance and meat yield characteristics in animal production (Navid *et al*. 2011; Odoemelam *et al*. 2013; Saulawa *et al*. 2015). Navid *et al*. (2011) reported that supplementation of 2% pawpaw leaves meal (PLM) in combination with vitamin D_3 in spent layer diet two weeks before slaughter, improved the meat quality. Odoemelam *et al*. (2013) established that inclusion of basil (*Ocimium gratissimum*) leaf at 1.00% level in broiler diets generally improved body weight gain, dressing percentage and promoted higher dressed weight and carcass quality. Saulawa *et al*. (2015) established that feeding pawpaw leaf meal at 10% inclusion level improved the growth performance of rabbits. It is therefore necessary to assess the potentials of some natural herbs on growth performance and carcass and meat yield of spent layers.

MATERIALS AND METHODS

Study Area

The feeding trial was conducted at the poultry production unit of Sokoto State Veterinary Centre, located at Aliyu Jedo Road, in Sokoto Metropolis. Sokoto State is within the savannah agro-ecological zone located on longitude $5^0$14'51.1872"E and latitude $13^0$0'21.1428" N at an altitude of 350 m above the sea level. The rainy season starts in mid-May to early June and reaches peak in August. Dry season starts in mid-October and ends in late May. The hottest periods are March to May while the coldest periods are December to February, characterized by dry harmattan winds (SERC, 2012). Sokoto State Veterinary Centre has an average annual temperature of 30.26^{o}C with average rainfall of 650 mm and average annual humidity of 48.54% (SERC, 2012; Ahmed and Egwu, 2014).

The test ingredients (curry, mint and pawpaw leaves) were obtained from the Sokoto main vegetable market within Sokoto metropolis. Other feedstuffs for compounding diet (maize, groundnut cake, blood meal, bone meal, wheat offal, salt, limestone, methionine, lysine and premix) were obtained from the Feed-mill section of the Sokoto Technology Incubation Centre (STIC), Sokoto.

Experimental Chickens and their Management

The 210 spent layer chickens of ISA Brown strain at 115 weeks old were purchased from the Labana Farms Limited, Aliero, in Aliero Local Government Area of Kebbi State. On arrival, the birds were fed broiler finisher diet and offered drinking water containing anti-stress (glucose), to relieve them of transit stress. An adaptation period of seven days was observed for the birds to adjust to their environment. They were subsequently distributed randomly using Completely Randomized Design (CRD) to seven treatment diets and fed for 14 days. The treatments consisted of a broiler finisher diet (BFD) = T1, BFD + 2% PLP = T2, BFD + 2% CLP = T3, BFD +2% MLP = T4, BFD + 1%CLP + 1% PLP = T5, BFD + 1% MLP + 1% PLP = T6 and BFD + 1% CLP + 1% MLP = T7. The seven treatment diets used in this experiment were formulated to satisfy 2900 Kcal ME/kg and 20% CP following NRC (1994) recommendations.

Table1: Gross and chemical composition of experimental diets

Ingredients (%)	Treatment Diets						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Maize	56.00	56.00	56.00	56.00	56.00	56.00	56.00
Wheat offal	22.50	22.50	22.50	22.50	22.50	22.50	22.50
Groundnut cake	15.50	15.50	15.50	15.50	15.50	15.50	15.50
Blood meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Salt	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Premix	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Methionine	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CLP	0.00	0.00	2.00	0.00	1.00	0.00	1.00
MLP	0.00	0.00	0.00	2.00	0.00	1.00	1.00
PLP	0.00	2.00	0.00	0.00	1.00	1.00	0.00
Calculated Chemical Composition							
ME(Kcal/kg)	2900.00	2920.49	2912.87	2913.75	2916.68	2917.12	2913.31
CP (%)	20.00	20.64	20.50	20.48	20.57	20.56	20.49
CF (%)	4.87	4.93	4.91	4.90	4.92	4.91	4.91
EE (%)	4.10	4.12	4.12	4.11	4.12	4.11	4.12

CLP- Curry leaf powder, MLP- Mint leaf powder, PLP- Pawpaw leaf powder, ME- Metabolizable energy, CP- Crude protein, CF- crude fibre, EE – ether extract

Experimental Layout

Two hundred and ten (210) spent layer birds were divided into seven groups of 30 birds each and apportioned to the seven dietary treatments. Each treatment group was replicated into three with 10 birds per replicate. The 7 x 3 = 21 treatment combinations were laid out in Completely Randomized Design (CRD).

Growth Performance Parameters

Daily feed intake was calculated by subtracting the quantity of feed left over from the quantity of feed given the previous day. Weight gain was calculated by subtracting the initial body weight of the birds from each treatment from their final body weight. Average daily gain was calculated from body weight gain divided by the total number of days of the experimental period.

Carcass Measurements and Organs Weight

Three birds were randomly selected from each treatment for carcass and primal parts yield estimation. The birds were weighed and then halal slaughtered, dressed and eviscerated to obtain the hot carcass weight. Dressing percentage was calculated as the ratio of the

dressed carcass weight to the live weight as in the equation below. Yields of primal cuts (breasts, drumsticks, thighs, giblets and viscera) were as a percentage of live weight.

$$\text{Dressing \%} = \frac{\text{dressed carcass weight}}{\text{live weight}} \times 100$$

Data Analysis

The data collected were subjected to one-way analysis of variance (ANOVA). Significant difference observed among treatment means were separated by Duncan's Multiple Range Test (DMRT) using SPSS version 21.0 2012, IBM USA.

RESULTS AND DISCUSSION

Growth Performance of Spent Layers

The growth performance of spent layer fed diet supplemented with curry, mint and pawpaw leaves is presented in Table 2. There were ($P<0.05$) differences in average daily feed intake and average daily weight gain. The birds in treatments 6 and 7 had significantly higher feed intake than those in treatments 3 and 4 ($P< 0.05$) but similar with those in treatments 1, 2 and 5 ($P> 0.05$). The birds in the control treatment had a significantly higher weight gain than those in treatment 3 ($P< 0.05$) but similar to other treatments (2, 4, 5, 6 and 7).

Table 2: Growth performance of spent layer according to treatments

Treatment	Ave. daily feed Intake (g/bird)	Initial body Weight (g)	Final body Weight (g)	Ave. daily gain (g/bird)
Overall	92.40	1711.93	1807.49	6.83
1	94.24^{ab}	1705.67	1863.56	11.28^{a}
2	94.06^{ab}	1683.33	1793.63	7.88^{ab}
3	85.67^{b}	1796.45	1835.22	2.77^{b}
4	83.73^{b}	1596.10	1708.77	8.05^{ab}
5	88.55^{ab}	1796.55	1886.03	6.39^{ab}
6	101.14^{a}	1748.39	1823.63	5.37^{ab}
7	99.39^{a}	1657.00	1741.61	6.04^{ab}
SEM	3.84	74.32	61.33	2.15

abcd= means bearing different superscripts within the same column differ ($P<0.05$)
Ave. - Average, SEM - standard error of mean

The high average daily feed intake obtained in treatments 6 and 7 could be due to synergistic effect of combinations (MLP + PLP) in treatment 6 and (BLP + MLP) in treatment 7supplemented to the diets that influences the intake of the birds. The high feed intake could also be due to the presence of flavonoids in the test ingredients, known to improve feed palatability and slowing peristaltic movements of feed in the guts of birds (Kass *et al*., 1980; Xu *et al*., 2006). The low feed intake observed in treatments 3 and 4 could be due to higher anti-nutritional compounds, tannins and saponins present in the test ingredients as reported by (Kumar *et al*. 2013; Igara *et al*. 2016; Salomi and Manimekalai 2016).

The higher value recorded in average daily gain observed for birds in the control diet could be due to non-inclusion of supplements in the diets which are known to have anti-nutritional compounds that hinder optimum utilization of nutrients in the feed.

Carcass Measurements and Organs Weight

Carcass and measurements and organs weight of spent layer fed diet supplemented with curry, mint and pawpaw leaves are presented in Table 3. There were significant differences in all the yield components observed. The birds in treatment 2 had significantly ($P<0.05$) higher carcass yield than birds in treatments 1, 5, 6 and 7 but similar to the birds in treatments 3 and 4 ($P> 0.05$). Birds in Treatments 1 and 3 birds yielded significantly lower breast yield than those from other treatments. Thigh yield was higher for birds in treatment 3 ($p<0.05$) than those birds in treatments 4 and 7 but similar to the birds in treatments 1, 2, 5 and 6. Yield of drumstick followed different trend with birds in treatment 6 having higher ($P<0.05$) yield t. Animals in treatment 4 had significantly higher yield of giblet than those in treatments 2, 5, 6 and 7 but are similar to the birds in treatments 1 and 3 ($P> 0.05$). The control treatment and treatment 4 had higher ($p<0.05$) viscera yield compared to treatments 2 and 5.

Table3: Carcass and Primal Cuts Yield According to Treatments

Treatment	Yield components (%)					
	Carcass	Breast	Thigh	Drumstick	Giblet	Viscera
Overall	57.13	28.13	17.09	13.18	9.99	19.66
1	53.75^{b}	26.13^{bc}	17.28^{ab}	13.12^{ab}	10.42^{ab}	17.96^{bc}
2	62.53^{a}	29.39^{ab}	16.91^{ab}	12.73^{ab}	7.94^{c}	16.09^{c}
3	58.01^{ab}	25.52^{c}	18.44^{a}	13.44^{ab}	10.69^{ab}	20.13^{ab}
4	58.14^{ab}	28.49^{abc}	15.83^{b}	12.35^{b}	12.52^{a}	21.59^{a}
5	57.12^{b}	30.76^{a}	17.31^{ab}	13.11^{ab}	9.36^{bc}	21.56^{a}
6	55.33^{b}	27.39^{abc}	17.39^{ab}	14.26^{a}	9.58^{bc}	20.14^{ab}
7	55.03^{b}	29.20^{ab}	16.46^{b}	13.20^{ab}	9.48^{bc}	20.18^{ab}
SEM	1.37	1.11	0.57	0.49	0.74	0.83

abc= means bearing different superscripts within the same column differ ($P<0.05$)
SEM - Standard error of mean

The high carcass yield observed for birds in treatment supplemented with pawpaw could be explained in terms of high flavonoids contents, which are known to stimulate digestive secretions, which will make for greater feed utilization leading to increased growth of carcass yield components (Zhu *et al*., 2006). Furthermore, high flavonoids contents of pawpaw serve as natural antioxidants known to increase antioxidative effect, therefore deterring oxidation and degradation of fat. Fat being a carcass component will accumulate which transform to higher carcass yield (Zhu *et al*., 2006; Bamidele, 2015).

The high giblet and viscera yield of birds in treatment supplemented with mint might be due to high tannins contents in the leaves known to affect optimum nutrient utilization in poultry (Ahmed *et al*., 1991; Manssori and Acamovic, 2007). According to Calislar (2017), poultry are very sensitive to tannins. High amounts of tannins could lead to low performances in poultry, such as reduced appetite, reduced feed intake and poor nutrient absorption. The

high weight of viscera could be described in relation to low feed utilization, thus causing high weight of viscera.

The high carcass yield of birds obtained (62.53%) is slightly lower compared to the value of 70% obtained by Nworgu (2016) that supplemented fresh basil leaf in the diets of growing pullets. The differences could be due to variation in diets, strain and the age of the birds.

The findings of this study are in line with the work of Odoemelam *et al*. (2013) who reported improved weight gain, dressing percentage and higher carcass quality on inclusion of basil leaf at 1.00% level.

CONCLUSION

It was concluded that supplementation of 2% PLP significantly improves the growth performance and carcass yield of spent layers. Thus, it was recommended that 2% PLP should be used in the diet of spent layers. Furthermore, heat treatment (oven dry) of test ingredients should be harnessed to reduce the anti-nutritional factors for effective utilization of secondary metabolites.

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